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ABSTRACT

Two hundred and twenty-five inservice experts (administrators, counselors, teachers, and curriculum specialists) from 15 school districts were surveyed, and their opinions used in planning an improved mathematics education teacher preparation program at a Texas university. Results of the survey indicate that although most of the parties felt adequately prepared for dealing with content and curriculum development, teaching methods such as individualized instruction and the operation of a mathematics laboratory were considered underdeveloped skills. Most of those surveyed stated that they were using teaching techniques traditional in the 1950's. Concerning the influence various organized groups of experts may have exerted on educational policy in the area of mathematics instruction; many of those surveyed either did not agree with the standards set by such groups or were not familiar enough with the groups themselves to comment. (LH)

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OPINIONS OF IN-SERVICE EXPERTS

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Recently there has been much discussion of accountability in education. Because of this, and the goal of program improvement is an ever present concern; a twenty item questionnaire was constructed to investigate the following questions:

1. What has been the impact of select study groups' (SMSG, CUPM, UICSM, NCTM, The Cambridge Conference on School Math) recommendations on curricula experts and teachers?
2. How have teachers' attitudes been effected by select study groups' recommendations?
3. Are the more recent innovations recommended regular features of classroom teaching?

When one traces the development of Mathematics education curricula, the philosophies of Mathematics learning, and recommendations of influential groups, one understands how to best plan future Mathematics programs.

Viewing all aspects of pre-service and in-service programs is important in determining the relationship between recommendations and the extent to which recommendations have been implemented. This too, will help identify existing problems, possible solutions, and the degree to which future recommendations may be implemented. For, the improvement of the competencies of Mathematics teachers is vital to the continued improvement of education today.

Method

Two hundred twenty-five inservice experts (administrators, counselors, teachers, curriculum specialists) from fifteen school districts within a

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200 mile radius of Houston, Texas were surveyed. These school districts' enrollment ranged from 665 to 250,000, with mean enrollment of approximately 33,850. Personnel response, by district, to the questionnaire ranged from 1 to 35.

The questionnaires were mailed in packet form, for distribution to the appropriate personnel by the school's principal. Each packet contained 5-10 questionnaires, a cover letter, and a stamped self-addressed envelope. Twenty-five questionnaires were distributed at the TSTA November 1976 Convention, and 65 others were personally distributed.

Instrumentation. The opinions of in-service mathematics personnel were solicited in planning an improved university Mathematics education pre-service in-service program.

The 20 item instrument represented a syntheses of (1) a 1976 pilot study and, (2) recommendations for pre-service and in-service programs by Mathematics education study groups (NACOME, 1975; CUPM, 1966; TEA, 1976; NCTM, 1971).

This 20 item questionnaire included items related to (1) the personnel and administrator (one), (2) school Mathematics education curriculum (seven), (3) opinion on teacher preparation (seven) and (4) school's or community's facilities (five).

Results

Of the one hundred persons surveyed 79% were teachers and 21% were administrators. Approximately 66% of the teachers were secondary, while 34% were elementary. More than 50% of the school districts had enrollment greater than ten thousand.

Table I

Descriptive Statistics on Sample

Positions		Number	Per cent
Teachers		79	79
Administrators		21	21
Grade Level Taught			
Elementary		27	34
Secondary		52	65
Years of Experience	1 - 5 per cent	6 - 15 per cent	over 15 per cent
Elementary Teachers	13	8	6
Secondary Teachers	24	21	7
Elementary Administrators	0	2	1
Secondary Administrators	0	6	12
School Enrollment	Less than 500 per cent 13	500-1000 per cent 12	More than 1000 per cent 75

Seventy-one percent viewed their administration's philosophy consistant with the progressive views.

The School Mathematics Curriculum and Teaching Practices

Most of those questioned felt competent in dealing with content and curriculum development. However, teaching techniques—individualized instruction, and mathematics laboratories were all rated as very weak.

Fundamentals of Mathematics (FOM), introductory algebra, algebra, geometry, trigonometry, and elementary analysis were offered in all of

the eleven districts responding to this question. Seventy-four per cent of the schools surveyed indicated their mathematics courses were divided into levels. Eighty-nine per cent of the secondary schools' mathematics program was designed to meet the needs of both college and non-college bound students. Seventy-six per cent of the administrators responding felt less than fifty per cent of the students take more than the minimum (2 units) mathematics requirement for graduation.

School's or Community's Facilities. Fifty-seven per cent of the teachers had access to a computer terminal. However, sixty-one per cent were not frequently called upon to provide basic instruction in the principles of computers. Approximately sixty-seven per cent of the elementary schools did not have a mathematics laboratory, while fifty-two per cent of the secondary schools made some use of the laboratory. Community resources available for facilitating learning experiences were available to seventy-three per cent of those responding.

Opinions on Teacher Preparation. Seventy per cent of the secondary teachers felt need for only those courses specifically taught on the secondary level as a part of the college program. Eighty-five per cent of the elementary teachers wanted algebra, plane geometry, structure of number systems, mathematics methods, experiences with classroom devices, displaying bulletin boards and elementary mathematics concepts. Seventy per cent felt the colleges were doing an adequate job of preparing teachers. Techniques of motivating students were listed as the area of greatest pre-service need. Over fifty per cent indicated a strong need in laboratory learning, mathematical applications, manipulatives, and problem solving. English, physics, and general science were the courses selected most often as first choice by administrators as second teaching fields for mathematics

majors. Teachers felt their greatest weaknesses in computer science, FOM, and use of mathematics laboratories.

Nonparametric Statistical Analysis of Data

Results of null hypotheses tested relative to specific items were: (1) Agreement among groups having different number of years of experience (experience groups). At least fifty per cent of the seventy per cent of personnel responding recommended College Algebra, Probability and Statistics, Analysis, Logic, Geometry, Trigonometry, Analytic geometry, Calculus, Student teaching, History of Mathematics, Math Lab experience and Fundamentals in Math Education as a necessary part of secondary math teacher preparation. Abstract Algebra, point set theory, differential equations, and curriculum models were recommended by fewer than fifty per cent of those making recommendations. (2) Agreement among experience groups on pre-service programs emphasizing courses specifically taught as opposed to greater emphasis on advanced preparation. (3) Agreement between the progressive versus non-progressive view that pre-service preparation should emphasize courses specifically taught. (4) Agreement among experience groups that the teacher education programs were adequate. (5) Agreement among experience groups relative to in-service and pre-service needs being basically the same, and (6) significant differences among experience groups relative to pre-service needs. The differences between the 1-5 years and 6-15 years, 6-15 years and over 15 years, and 1-5 and over 15 years experience groups were: $z = 4.37$, $p < .005$; $z = 3.06$, $p < .005$; $z = 1.74$, $p < .005$, respectively.

Conclusions

Mathematics teachers are relatively well satisfied with their teacher preparation. They do, however, have some problems. These problem areas involve teaching techniques.

Although most of those questioned indicated a progressive view, few seemed secure in dealing with the more recent innovations in teaching mathematics. Most were actually using the same tradition methods used before the fifties.

These experts did not feel that the high standards recommended by Committee on Undergraduate Programs in Mathematics (CUPM) were absolutely necessary, especially among elementary teachers.

Since many teachers indicated that they were not familiar with the study groups such as SMSG, CUPM, and UICSM, the influence of these groups upon actual teaching practices must be questioned.

Recommendations for Pre-service and In-service Needs

1. Colleges need to continue with their minimum mathematical requirements in order to maintain the satisfactory level of knowledge indicated by the survey.

2. Because of the response from those surveyed, more emphasis must be placed on the teaching techniques.

3. Areas such as motivation, slow learners, applications of mathematics, manipulative, and problem solving need to be stressed more in pre-service and in-service programs.

4. In order that teachers may be aware of developments in their profession, more emphasis needs to be placed on study groups' recommendations and policies.

5. Based on some of the comments made, there seems to be a need for more communication and less hostility between elementary and secondary teachers.

Recommendations for Further Studies

1. Do a pilot study with limited sample size, go into the school and observe the facilities—determine the validity of teachers' responses

by observing.

2. Do a similar study with a larger population, and allow for random selection of sample.

3. Do a study which will indicate the actual degree to which the recommendations of the study groups have been implemented, or use a measure of student learning.

4. Do a study to determine the affects of other variables—mathematics background of teacher, people orientation, teacher education background, and updating of professional experiences.

5. Because of comments received, the instrument itself merits further study and publication.